AMENDMENT TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of claims

1. (Original) A catalyst for the manufacture of alkylene oxide by the vapor-phase epoxidation of alkene, said catalyst comprising impregnated silver and at least one efficiency-enhancing promoter on a refractory solid support, said support incorporating a sufficient amount of zirconium component to enhance at least one of catalyst activity, efficiency and stability as compared to a similar catalyst which does not contain the zirconium component, said zirconium component being present in the support substantially as zirconium silicate.

2. (Cancelled)

3. (Cancelled)

4. (Original) The catalyst of claim 1 wherein the impregnated silver is present from about 2 to 60 % by weight of the catalyst.

5. (Original) The catalyst of claim 4 wherein the impregnated silver is present from about 5 to 50 % by weight of the catalyst.

6. (Original) The catalyst of claim 5 wherein the impregnated silver is present from about 10 to 40 % by weight of the catalyst.

7. (Original) The catalyst of claim 1 wherein at least one of the efficiency enhancing promoters comprises at least one alkali metal, alkaline earth metal and/or oxyanion of an element, other than oxygen, having an atomic number of 5 to 83 and being selected from groups 3b through 7b and 3a through 7a of the Periodic Table.

8. (Original) The catalyst of claim 1 wherein at least one of the efficiency-enhancing promoters is a member of a redox-half reaction pair.

9. (Original) The catalyst of claim 7 wherein at least one of the efficiency-enhancing promoters is a rhenium component.

10. (Currently Amended) The catalyst of claim 1 wherein the [[said]] refractory solid support, exclusive of zirconium component, is at least 95 % by weight alpha alumina.

11. (Currently Amended) The catalyst of claim 10 wherein the [[said]] refractory solid support, exclusive of zirconium component, contains less than about 2000 ppmw calcium.

12. (Currently Amended) The catalyst of claim 11 wherein the [[said]] refractory solid support, exclusive of zirconium component, contains less than about 350 ppmw calcium.

13. (Currently Amended) The catalyst of claim 10 wherein the [[said]] refractory solid support, exclusive of zirconium component and calcium compounds, contains less than about 500 ppmw alkaline earth metal, measured as the alkaline earth metal oxide.

14. (Currently Amended) The catalyst of claim 1 wherein the [[said]] refractory solid support, exclusive of zirconium component, is at least 99 % by weight alpha alumina.

15. (Currently Amended) The catalyst of claim 14 wherein the [[said]] refractory solid support, exclusive of zirconium component, contains less than about 2000 ppmw calcium.

16. (Currently Amended) The catalyst of claim 15 wherein the [[said]] refractory solid support exclusive of zirconium component contains less than about 350 ppmw calcium.

17. (Currently Amended) The catalyst of claim 14 wherein the [[said]] refractory solid support, exclusive of zirconium component and calcium compounds, contains less than about 500 ppmw alkaline earth metal, measured as the alkaline earth metal oxide.

18. (Original) The catalyst of claim 14 wherein the refractory solid support has a morphology comprising interlocking platelets of alpha-alumina.

19. (Currently Amended) The catalyst of claim 1 wherein the said refractory solid support has a surface area of at least about 0.5 [[4]] m2/g, a pore volume of at least about 0.5 cc/g, and a median pore diameter between about 1 to 50 [[25]] microns.

20. (Original) The catalyst of claim 1 wherein the zirconium component comprises from about 0.01 to 10.0 % by weight of zirconium silicate based on the total weight of the support.

21. (Original) The catalyst of claim 20 wherein the zirconium component comprises from about 0.1 to 5.0 % by weight of zirconium silicate based on the total weight of the support.

22. (Original) The catalyst of claim 21 wherein the zirconium component comprises from about 0.3 to 3.0 % by weight of zirconium silicate based on the total weight of the support.

23. (Currently Amended) A method for the epoxidation of an alkene comprising the steps of: contacting a feed comprising an alkene and oxygen with the catalyst of claim 1.

24. (Currently Amended) The method of claim 23 wherein said alkylene oxide is ethylene oxide.

25. (New) A process for the epoxidation of an olefin comprising the steps of: contacting a feed comprising an olefin and oxygen with a catalyst comprising a silver component deposited on a fluoride-mineralized carrier; and producing a product mix comprising an olefin oxide, wherein the partial pressure of olefin oxide in the product mix is greater than about 60 kPa.

26. (New) A process as claimed in claim 25, wherein the catalyst additionally comprises a high-selectivity dopant.

27. (New) A process as claimed in claim 26, wherein the high-selectivity dopant comprises a rhenium component.

28. (New) A process as claimed in claim 25, wherein the catalyst additionally comprises Group IA metal component.

29. (New) A process as claimed in claim 25, wherein the carrier comprises alpha-alumina.

30. (New) A process as claimed in claim 25, wherein the olefin comprises ethylene.

31. (New) A process for the epoxidation of an olefin comprising the steps of: contacting a feed comprising an olefin and oxygen with a catalyst comprising a silver component and a high-selectivity dopant deposited on a fluoride-mineralized carrier; and producing a product mix comprising an olefin oxide, wherein the partial pressure of olefin oxide in the product mix is greater than about 20 kPa.

32. (New) A process as claimed in claim 31, wherein the high-selectivity dopant comprises a rhenium component.

33. (New) A process as claimed in claim 32, wherein the catalyst additionally comprises a rhenium co-promoter.

34. (New) A process as claimed in claim 31, wherein the catalyst additionally comprises a Group IA metal component.

35. (New) A process as claimed in claim 31, wherein the process employs a fixed bed, tubular reactor.

36. (New) A process as claimed in claim 31, wherein the partial pressure of olefin oxide is greater than about 30 kPa.

37. (New) A process as claimed in claim 31, wherein the partial pressure of olefin oxide is from about 40 kPa to about 60 kPa.

38. (New) A process as claimed in claim 31, wherein the carrier comprises alpha-alumina.

39. (New) A process as claimed in claim 31, wherein the olefin comprises ethylene.

40. (New) A process for the epoxidation of an olefin comprising the steps of: contacting a feed comprising an olefin and oxygen with a catalyst comprising a silver component deposited on a carrier having a particulate matrix having a lamellar or platelet-type morphology; and producing a product mix comprising an olefin oxide, wherein the partial pressure of olefin oxide in the product mix is greater than about 60 kPa.

41. (New) A process as claimed in claim 40, wherein the lamellar or platelet-type morphology is such that particles having in at least one direction a size greater than 0.1 micrometer have at least one substantially flat major surface.

42. (New) A process for the epoxidation of an olefin comprising the steps of: contacting a feed comprising an olefin and oxygen with a catalyst comprising a

silver component and a high-selectivity dopant deposited on a carrier having a particulate matrix having a lamellar or platelet-type morphology; and producing a product mix comprising an olefin oxide, wherein the partial pressure of olefin oxide in the product mix is greater than about 20 kPa.

43. (New) A process as claimed in claim 42, wherein the high selectivity dopant comprises a rhenium component and the catalyst additionally comprises a rhenium co-promoter.

44. (New) A process as claimed in claim 42, wherein the lamellar or platelet-type morphology is such that particles having in at least one direction a size greater than 0.1 micrometer have at least one substantially flat major surface.

45. (New) A process for the production of a 1,2-diol, a 1,2-diol ether or an alkanolamine comprising converting an olefin oxide into the 1,2-diol, the 1,2-diol ether or the alkanolamine wherein the olefin oxide has been obtained by a process for the epoxidation of an olefin as claimed in claim 25.

46. (New) A process for the epoxidation of an olefin comprising the steps of: contacting a feed comprising an olefin and oxygen with a catalyst comprising a silver component deposited on an alpha-alumina carrier; and producing a product mix comprising an olefin oxide, wherein the partial pressure of olefin oxide in the product mix is from about 20 to 28 kPa, and wherein said alpha-alumina is prepared by a process comprising the step of contacting an alpha-alumina precursor with fluoride anions.

47. (New) A process as claimed in claim 46, wherein said alpha-alumina is prepared by contacting an alpha-alumina precursor with fluoride anions followed by calcining the fluoride-contacted alpha-alumina precursor under conditions sufficient to form platelets of alpha-alumina.

48. (New) A process as claimed in claim 46, wherein the catalyst additionally comprises a promoter selected from the group consisting of compounds of rhenium, molybdenum, tungsten, and an efficiency-enhancing salt of a member of a redox half-reaction pair comprising nitrate, nitrite, or other anions capable of forming nitrate anions under epoxidation conditions in the presence of a nitrogen-containing gaseous efficiency-enhancing member of a redox half-reaction pair.

49. (New) A process as claimed in claim 48, wherein the promoter comprises a rhenium component.

50. (New) A process as claimed in claim 46, wherein the catalyst additionally comprises a Group IA metal cation.

51. (New) A process as claimed in claim 46, wherein said alpha-alumina carrier is prepared by a method comprising the steps of:

a) selecting an alumina selected from the group consisting of boehmite alumina (AlOOH), gamma-alumina and mixtures thereof;

b) peptizing the alumina of step (a) with a mixture containing an acidic component and fluoride anions to provide peptized fluorinated alumina;

c) forming the peptized fluorinated alumina of step (b) to provide formed peptized fluorinated alumina;

d) drying the formed peptized fluorinated alumina of step (c) to provide dried formed alumina; and

e) calcining the dried formed alumina of step (d).

52. (New) A process as claimed in claim 51, wherein zirconium silicate is mixed with the alumina of step (a) prior to the peptizing step.

53. (New) A process as claimed in claim 46, wherein the olefin comprises ethylene.

54. (New) A process as claimed in claim 49, wherein the catalyst additionally comprises a rhenium co-promoter.

55. (New) A process as claimed in claim 48, wherein the process employs a fixed bed, tubular reactor.

56. (New) A process for the epoxidation of an olefin comprising the steps of: contacting a feed comprising an olefin and oxygen with a catalyst comprising a silver component deposited on an alpha-alumina carrier comprising particles each of which has at least one substantially major surface having a lamellate or platelet morphology; and producing a product mix comprising an olefin oxide, wherein the partial pressure of olefin oxide in the product mix is in from about 20 to 28 kPa.

57. (New) A process as claimed in claim 56, wherein said alpha-alumina is prepared by contacting an alpha-alumina precursor with fluoride anions followed by calcining the fluoride-contacted alpha-alumina precursor under conditions sufficient to form platelets of alpha-alumina.

58. (New) A process as claimed in claim 56, wherein said alpha-alumina carrier is prepared by a method comprising the steps of:

a) selecting an alumina selected from the group consisting of boehmite alumina (AlOOH), gamma-alumina and mixtures thereof;

b) peptizing the alumina of step (a) with a mixture containing an acidic component and fluoride anions to provide peptized fluorinated alumina;

c) forming the peptized fluorinated alumina of step (b) to provide formed peptized fluorinated alumina;

d) drying the formed peptized fluorinated alumina of step (c) to provide dried formed alumina; and

e) calcining the dried formed alumina of step (d).

59. (New) A process as claimed in claim 58, wherein zirconium silicate is mixed with the alpha-alumina precursor of step (a) prior to the peptizing step.

60. (New) A process for the epoxidation of an olefin comprising the steps of: contacting a feed comprising an olefin and oxygen with a catalyst comprising a silver component and a promoter selected from the group consisting of compounds of rhenium, molybdenum, tungsten, and an efficiency-enhancing salt of a member of a redox half-reaction pair comprising nitrate, nitrite, or other anions capable of forming nitrate anions under epoxidation conditions in the presence of a nitrogen-containing gaseous efficiency-enhancing member of a redox half-reaction pair deposited on an alpha-alumina carrier comprising particles each of which has at least one substantially major surface having a lamellate or platelet morphology; and producing a product mix comprising an olefin oxide, wherein the partial pressure of olefin oxide in the product mix is from about 20 to 28 kPa.

61. (New) A process as claimed in claim 60, wherein said alpha-alumina is prepared by contacting an alpha-alumina precursor with fluoride anions followed by calcining the fluoride-contacted alpha-alumina precursor under conditions sufficient to form platelets of alpha-alumina.

62. (New) A process as claimed in claim 60, wherein said alpha-alumina carrier is prepared by a method comprising the steps of:

a) selecting an alumina selected from the group consisting of boehmite alumina (AlOOH), gamma-alumina and mixtures thereof;

b) peptizing the alumina of step (a) with a mixture containing an acidic component and fluoride anions to provide peptized fluorinated alumina;

c) forming the peptized fluorinated alumina of step (b) to provide formed peptized fluorinated alumina;

d) drying the formed peptized fluorinated alumina of step (c) to provide dried formed alumina; and

e) calcining the dried formed alumina of step (d).

63. (New) A process as claimed in claim 62, wherein zirconium silicate is mixed with the alpha-alumina precursor of step (a) prior to the peptizing step (b).

64. (New) A process as claimed in claim 60, wherein the catalyst additionally comprises a rhenium component and the catalyst additionally comprises a rhenium co-promoter.